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I further certify that pursuant to the provisions of Section 38(1) of the Patents Act 1990 a complete specification was filed on 07 October 1999 and it is an associated Application to Provisional Applications Nos. PP 6419, PQ 0289, PQ 0290 and PQ 1852 and has been allocated No. 53527/99

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Twenty-eighth day of October 1999

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PROVISIONAL SPECIFICATION FOR THE INVENTION ENTITLED:

Providing Audio Response to User Interaction

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This invention is best described in the following statement:

PROVIDING AUDIO RESPONSE TO USER INTERACTION

FIELD OF THE INVENTION

The present invention relates to the field of programmable user interfaces, and in particular to the aspect of providing a feedback cue which is discernible to the user, when the user utilises the interface.

BACKGROUND

The advent of smartcards has generated widespread interest, and has led to a proliferation of different applications of the technology. In a distinct but related field, there has also been widespread interest in user interfaces, particularly interfaces which are simple to use and which assume little or no technical knowledge by the user. Devices with user interfaces are typically proprietary devices made by different manufacturers, and there are, therefore, as many interfaces and interface standards as there are devices. Attempts have been made to make use of user interfaces which can operate in conjunction with a number of different devices and/or applications. Devices of this type make use either of standard layouts for press-switches, or alternatively, make use of templates which can be fitted over the actuating buttons of the device. This latter approach provides an explanation of the control functions available, this explanation being "programmable" or changeable by means of changing the template.

The template solution requires that button actuators be in known, fixed positions, and thus requires that various devices adopt a standard button actuator layout. This clearly is a problem since standardisation is not necessarily accepted even within individual manufacturing organisations.

Taking another approach, efforts have been made to use programmable memory modules both for data storage, and also as programmable user interfaces. This approach makes use of defined regions on memory modules, these regions being associated with particular actions which are initiated when the visible regions on the memory card are touched or pressed by user. The memory card or module must first have been inserted into a suitable memory module reader. This application of programmable memory modules as user interfaces relies heavily on visual cues to enable the user to ascertain when the desired region on the card has been touched. The surface of memory modules is typically flat, offering few or no tactile feedback cues to a user. The only feedback cue generally available to assure or inform the user that the correct region has been touched, is that the user can typically see that they are touching the correct region. In addition of course, if the resulting action is correctly performed, the user will also have feedback that he has pressed the correct region.

There are, however, circumstances where visual feedback cues are not available, for example when a device is used in a low-light condition. Furthermore, a user's attention may be somewhere else such as on a visual display device or TV monitor, and not on the control keys. Alternatively, a user may be vision-impaired, in which circumstances visual feedback is not appropriate. Having regard to feedback by means of the action performed, clearly it would not be acceptable in many instances to receive feedback only after the incorrect action has been performed. Such might be the case in operating a power tool for example.

The present invention intends to overcome or ameliorate some or all of the aforementioned problems.

SUMMARY OF THE INVENTION

In one aspect therefore, the present invention discloses a programmable memory card including a user interface on a surface of said card, said interface comprising at least a region intended to receive a stimulus from a user, said region being associated with a feedback signal and an action signal.

BRIEF DESCRIPTION OF THE DRAWINGS

A number of preferred embodiments of the present invention will now be described in more detail with reference to the accompanying drawings, in which:

Fig. 1 depicts a generic smartcard with programmable/customised regions;

Fig. 2 depicts a preferred embodiment of a one-touch customised smartcard for telephony applications;

Fig. 3 presents a preferred embodiment of a cordless telephone adapted for use with a customised smartcard;

Fig. 4 depicts a preferred embodiment of a public telephone adapted for use with the aforementioned smartcards;

Fig. 5 presents another embodiment of a smartcard directed towards a control function;

Fig. 6 presents a process flow diagram of a preferred embodiment from the user perspective;

Fig. 7 presents a process flow diagram of a preferred embodiment from the card reader perspective;

Fig. 8 depicts local visual feedback on the surface of a smartcard;

Fig. 9 presents a process flowchart for a preferred embodiment of a programming/printing apparatus; and

Fig. 10 depicts an indexing apparatus in a preferred embodiment.

DETAILED DESCRIPTION

In the context of this specification and claims, the word "comprising" means "including principally, but not necessarily solely". Variation of the word "comprising", such as "comprise" and "comprises" have correspondingly varied meanings.

Fig. 1 depicts a smartcard 100 from a top perspective view. The integrated circuit (IC) microprocessor 104 is shown in dashed line representation, along with the electrical contacts 106, the dashed lines indicating that the IC is situated on the opposite, or hidden, side of the smartcard 100. On the upper surface 110 of the smartcard 100 two designated regions 102 and 108 are shown. These regions 102 and 108 are made visually distinct by means of printing a circle on the upper surface 110 of the smartcard 100 in each instance. When the smartcard 100 is inserted into an appropriate smartcard reader (not shown), the reader is able to detect when a person presses one of the designated regions 102 and 108 with their finger, and in association with the appropriate programming in the IC 104, is able to identify the region which has been pressed. The aforementioned functionality enables the smartcard 100 together with the card reader to function as a user interface mechanism, allowing the person to enter control signals, for example, by pressing the appropriate region (e.g. 108) on the smartcard 100.

Fig. 2 depicts a particular example of a smartcard as described in relation to Fig. 1. In Fig. 2, a smartcard 200 has a number of designated regions 204-212 on an upper surface 202 of the card 200. In this particular example, the card 200 is intended for use as a programmable user interface in a telephone (not shown). In particular, in

this example, the smartcard 200 is intended for use by a child. Region 204 is, therefore, associated with the telephone number for the child's mother when she is at her office, while region 206 is similarly associated with the child's father at his place of employment. The large region 212 is associated with emergency calls directed toward police, fire, and ambulance, while the lower regions 208 and 210 are associated with two of the child's friends at their homes.

Fig. 3 depicts a personal cordless telephone 300 which may be used in association with the smartcard described in relation to Fig. 2. The telephone 300 incorporates a speaker 302, a microphone 304, and a recess 306 through which the upper surface 202 of a smartcard 200 may be accessed by the user. The smartcard 200 is inserted into the telephone 300 through a slot 310 as indicated by an arrow 308. Electrical contacts on the rear surface of the smartcard 200 make electrical contact with corresponding electrical contacts 314 located in the recess 306 of the telephone 300. The cordless telephone 300 communicates by means of infrared, or alternatively radio, signals as depicted by arrow 316 with a telephone base station 318. The base station 318 is connected to the public switched telephone network (PSTN) (not shown) by means of a cord 320. The child discussed in relation to Fig. 2 can, by inserting the smartcard 200 into the cordless telephone 300, have easy access by means of one-touch "buttons" eg. 204 (see Fig. 2), to a number of relevant people including mother, father and so on.

Fig. 4 presents an illustrative depiction of a public telephone 400 complete with a microphone 402 and a speaker 406. The public telephone 400 is not equipped with a normal keypad, however instead is fitted with a smartcard receptacle 410. The smartcard 200 can be inserted into the receptacle 410 as depicted by an arrow 408, thereby exposing the upper surface 202 of the smartcard 200 through an aperture 412.

When the child previously discussed inserts the smartcard 200 as described into the telephone 400, the child has simple and uncomplicated access to the same important telephone numbers as was the case with the cordless telephone 300, which would be used in his home.

Fig. 5 depicts a different application for a smartcard 500, which has on its upper surface 502, a number of regions 504 to 514. In this instance, the smartcard 500 is not intended for use with telephones, either private (eg. 300), or public (eg. 400), but is rather intended to be used as a control interface in a CD player which is suitably equipped with a smartcard reader (not shown). In such a case, a user could, by pressing on region 510 provide a control signal to the CD player to play a CD selection, the selection could be paused by pressing region 506, the selection could be "wound" fast forward or fast reverse by pressing regions 514 and 508 respectively, and finally the CD player could be switched off by pressing region 512.

Fig. 6 presents a process flow diagram for operation of a smartcard user interface presented from a user perspective. A user inserts a smartcard into an appropriate reader in process step 600, and touches a "button", or a "region" as described previously, at a designated position on the card in process step 602. In this instance, the smartcard, and card reader are appropriately equipped so that the keystroke described in the process step 602 results in a sound being emitted in process step 604. The sound which is emitted is characteristic of the particular button which was pressed in the process step 602, and represents a form of feedback cue by which the user can verify that a particular button has been pressed. Finally, in step 606 an action associated with the particular button being pressed is performed. Thus for example, having reference to the "telephone smartcard" 200 described in relation to Fig. 2, the sound emitted in process step 604 when the region 204 associated with the

child's mother is pressed, might be a particular jingle associated with the child's mother, or alternatively, a synthesised voice output presenting the word "Mother" or "Mom". In this instance, the action associated with process step 606 is to establish a telephone call to the child's mother at the appropriate number associated with the aforementioned region 202.

Fig. 7 presents a process flow diagram from the perspective of a card reader into which a smartcard as described is inserted. In a process step 700 the card insertion is detected, whereafter in a process step 702, the card reader detects that the user has touched one of the designated regions. In the following process step 704, the card reader makes reference to mapping information in order to identify the particular region pressed by the user, whereafter in step 706 the action associated with the particular region in question is retrieved from a memory. In a process step 708, the particular action being requested through touching the specified region is sent to the application in question. In the present case, and making reference to the child's telephone interface previously discussed, the action would be "to establish a telephone connection with the child's Mother", and the application in question would be a telephony communications application. In the following process step 710, the feedback sound associated with the particular region in question is retrieved, whereafter it is played in step 712 to the user.

Fig. 8 indicates how the feedback signal may, instead of being an audio signal as previously described in relation to Figs. 6 and 7, be a visible feedback signal such as a flashing light emitting diode (LED) 802, which in the present case is located directly on the upper surface of a smartcard 800. Alternatively, the LED could be located on the cordless telephone 300 (see Fig. 3), or on the public telephone 400 (see Fig. 400). It is noted that instead of individual LEDs, strings of LEDs could be used, with a customized pattern forming the feedback signal. Alternatively, a very low cost liquid

crystal display (LCD) could be used to provide customizable visual feedback comprising characters and/or graphics.

Given the wide range of applications to which the programmable smartcard interface may be applied, and the almost infinite range of data associated with the applications, a means of programming the required data into a smartcard is required, and a process flowchart in this regard is presented in Fig. 9. In process step 900 a coordinate for a specified region is entered, while in parallel (or alternatively sequentially) information associated with the region in question is entered in process step 902. Again making reference to the child's telephone card 200, a coordinate of region 204 is an x-y coordinate range measurement measured from a convenient point, say a bottom left corner of the card, while the information associated with the region 204 is the telephone number for the child's Mother at her place of work. Once both these pieces of information are provided, they are loaded into program memory in step 904. Thereafter in step 906, the programming process tests whether further information is to be programmed onto the card. In the event that further information is required, the programming process is directed back to process step 900 and 902 as shown by arrow 912. In the event, however, that the programming is complete, the programming process is directed to a process step 908, where the programmer is able to select appropriate graphics to print onto the smartcard upper surface. In previous examples, the various regions eg. 204 on the smartcard 200 have been represented by simple oval outlines. It is possible, however, to make use of more complex graphics, and for example a miniature picture of the child's Mother can be printed on the card in the region 204.

An issue which is likely to arise as use of programmable customer-interface smartcards increases, is that of systematic storage of the cards, and subsequent retrieval

in a simple and efficient manner of the appropriate cards. One can image that over a period of time a person could accumulate hundreds of such cards for various applications, and an efficient and simple storage and retrieval mechanism would make their ongoing use more practical. Fig. 10 depicts a storage and retrieval apparatus 1000 which is equipped with a carousel 1002 into which individual smartcards 1004 may be inserted and stored as depicted by an arrow 1006. The apparatus 1000 is connected by means of a cord 1012 to a computing device (not shown). The slots in the carousel 1002 are equipped with suitable contact mechanisms so that when the smartcards 1004 are inserted, the information on the smartcard 1004 is accessible to the computing device. When a user wished to retrieve a particular smartcard, say 1004, the user can enter an appropriate keyword, where upon the computing device controls the indexing apparatus 1000, rotating the carousel 1002 until the appropriate smartcard, say 1004, is located immediately opposite an arrow 1008 embossed on the upper surface of the apparatus 1000. Keyword searches of this type may be based upon any information class stored on the smartcards, including names, company designations, and so on. Alternatively, the computing device may accumulate and store information on most frequently used smartcards, and enable the user to retrieve smartcards on this basis.

Programmable user-interface smartcards may be used in a wide variety of applications. In addition to customised use in telephone and similar equipment, where one touch operation may be advantageous from the perspective of ease of use, more complex key-stroke, or touch sequences may also be programmed into the cards.

Thus, for example, interactive voice response (IVR) systems which require a user to step through a menu of options prior to reaching a desired called-party, may be more easily accessed by pre-programming a known sequence of key-strokes into a smartcard.

Such cards can also be used as promotional handouts, wherein the telephone number of a supplier can be pre-programmed along with various "buttons" which can be pressed giving one-touch simple ordering capability.

The foregoing describes a number of embodiments for the present invention. Further modifications can be made thereto without departing from the scope of the inventive concept.

Aspect of the Invention

The following numbered paragraphs describe aspects of the invention:

1. A programmable memory card including a user interface on a surface of said card, said interface comprising at least a region intended to receive a stimulus from a user, said region being associated with a feedback signal and an action signal.

2. A memory card according to paragraph 1, wherein the card comprises a number of distinct regions.

3. A memory card according to either paragraph 1 or 2, wherein the feedback signal is an audio signal.

4. A memory card according to either paragraph 1 or 2, wherein the feedback signal is a visible signal, and wherein visible signal means associated with the feedback signal are disposed substantially upon or substantially within the card.

5. A memory card according to any of paragraphs 1- 4 wherein data associated with the feedback signal is stored on the memory card.

6. A memory card according to any of paragraphs 1- 4 wherein data associated with the feedback signal is stored in an external storage means.

7. A memory card according to any of paragraphs 1- 4 wherein data associated with the action signal is stored on the memory card.

8. A memory card according to any of paragraphs 1- 4 wherein data associated with the action signal is stored in an external storage means.

DATED this ELEVENTH day of MAY 1999
Canon Kabushiki Kaisha

Patent Attorneys for the Applicant
SPRUSON & FERGUSON

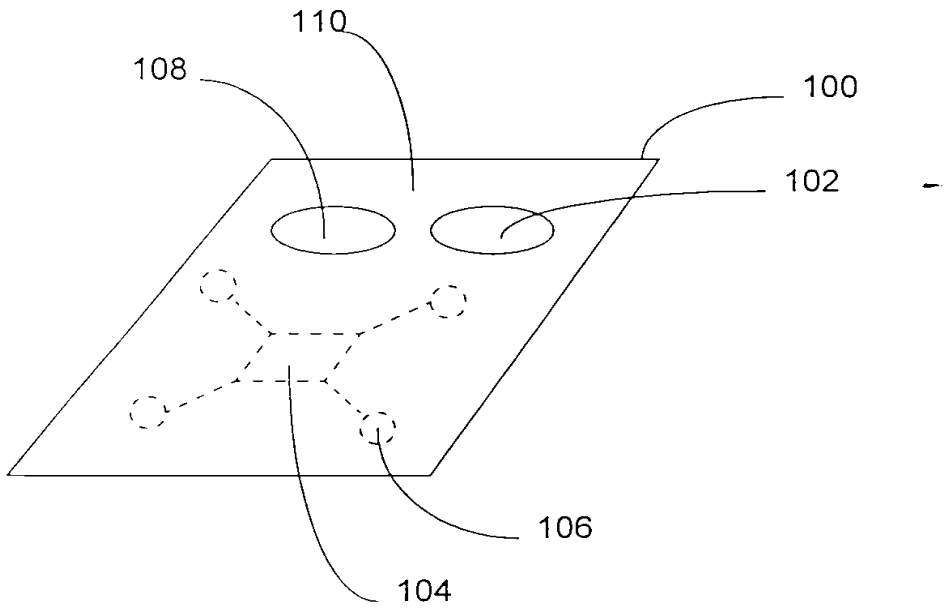

Fig. 1

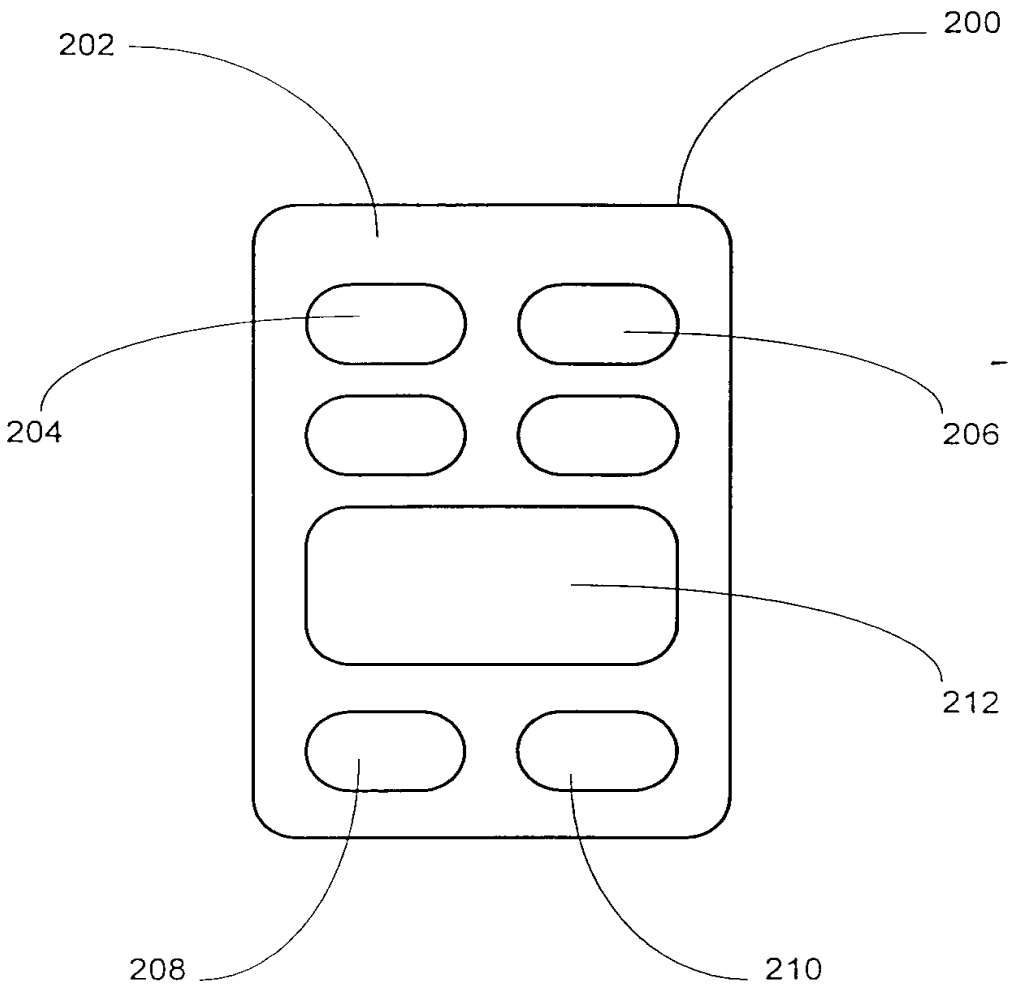

Fig. 2

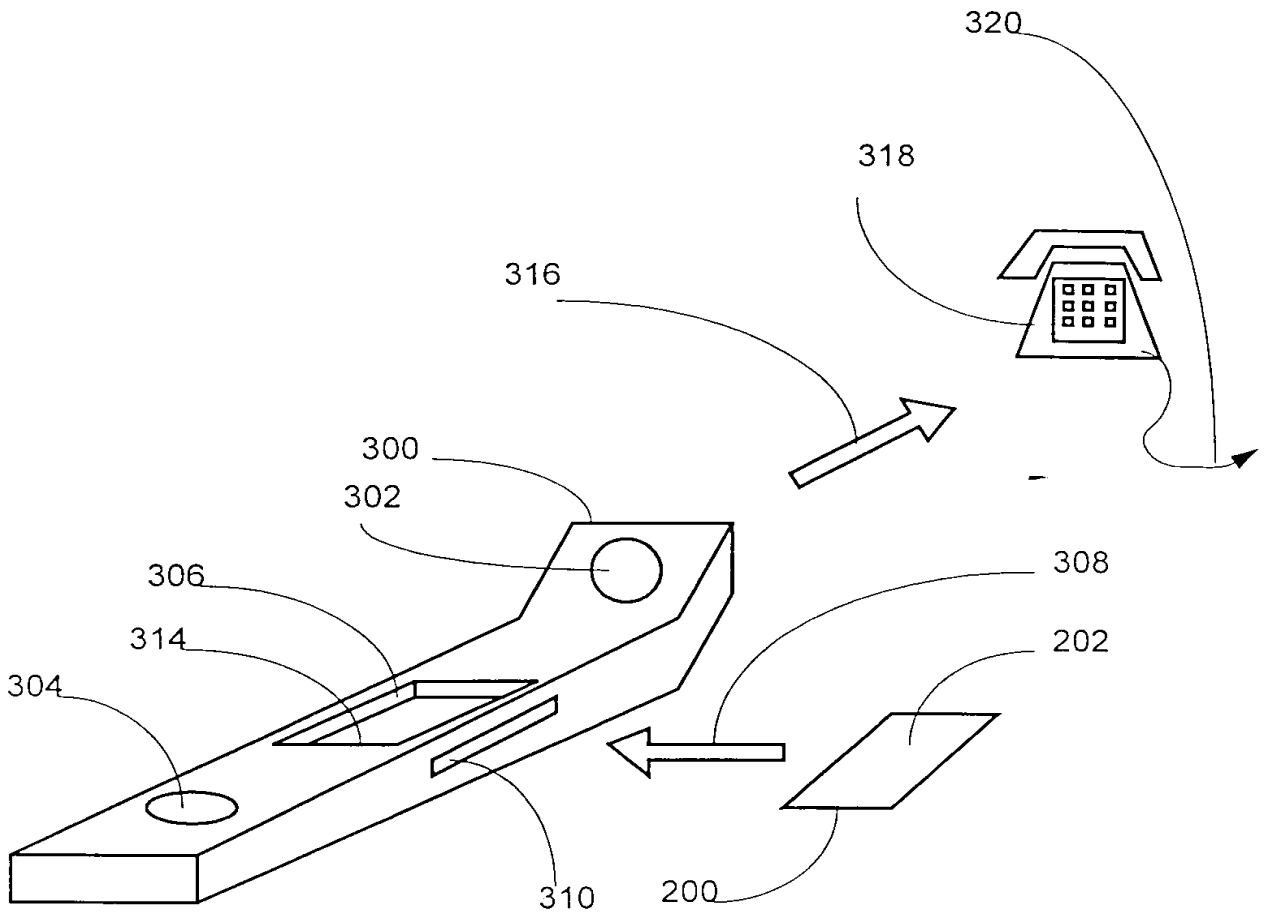

Fig. 3

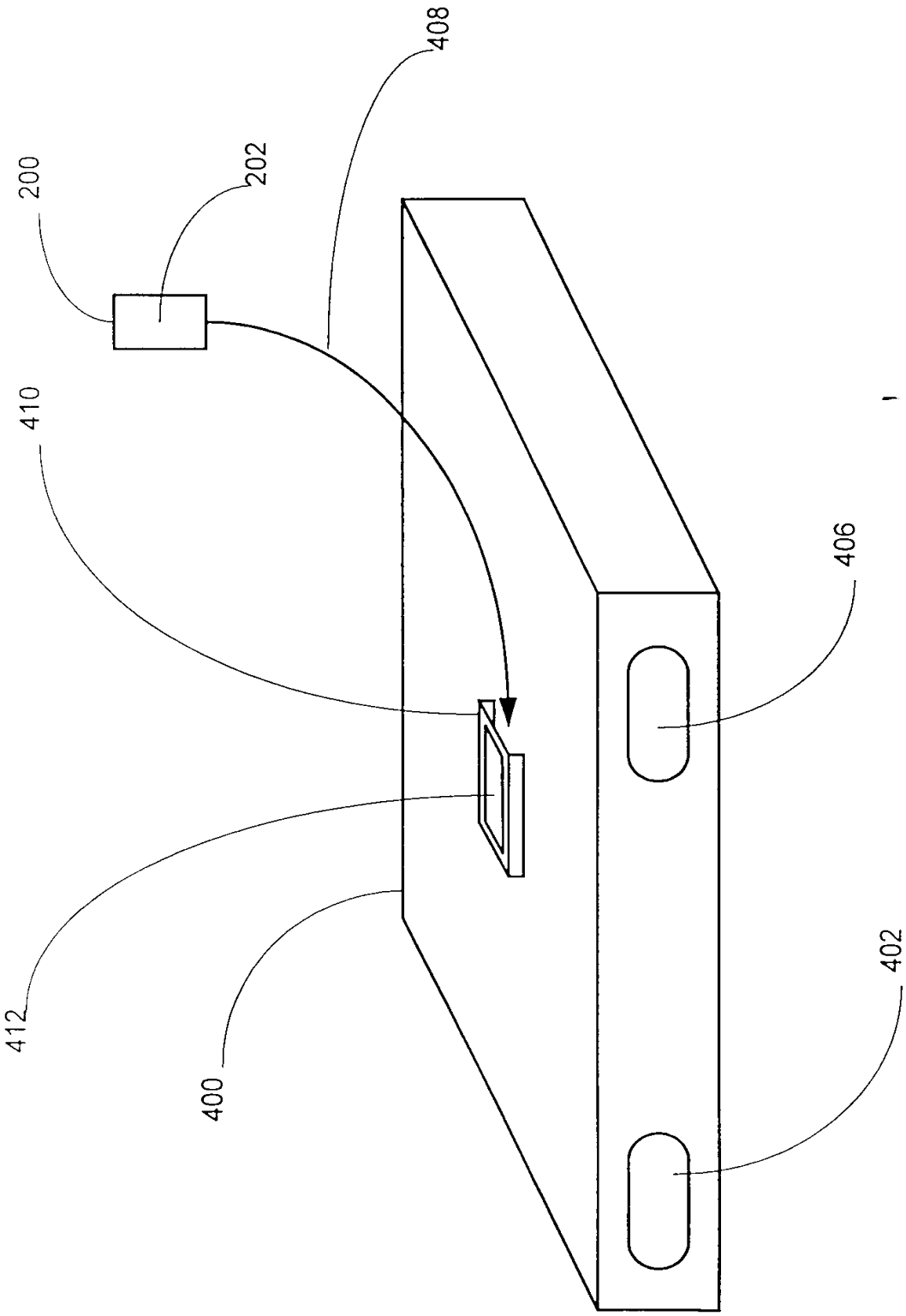

Fig. 4

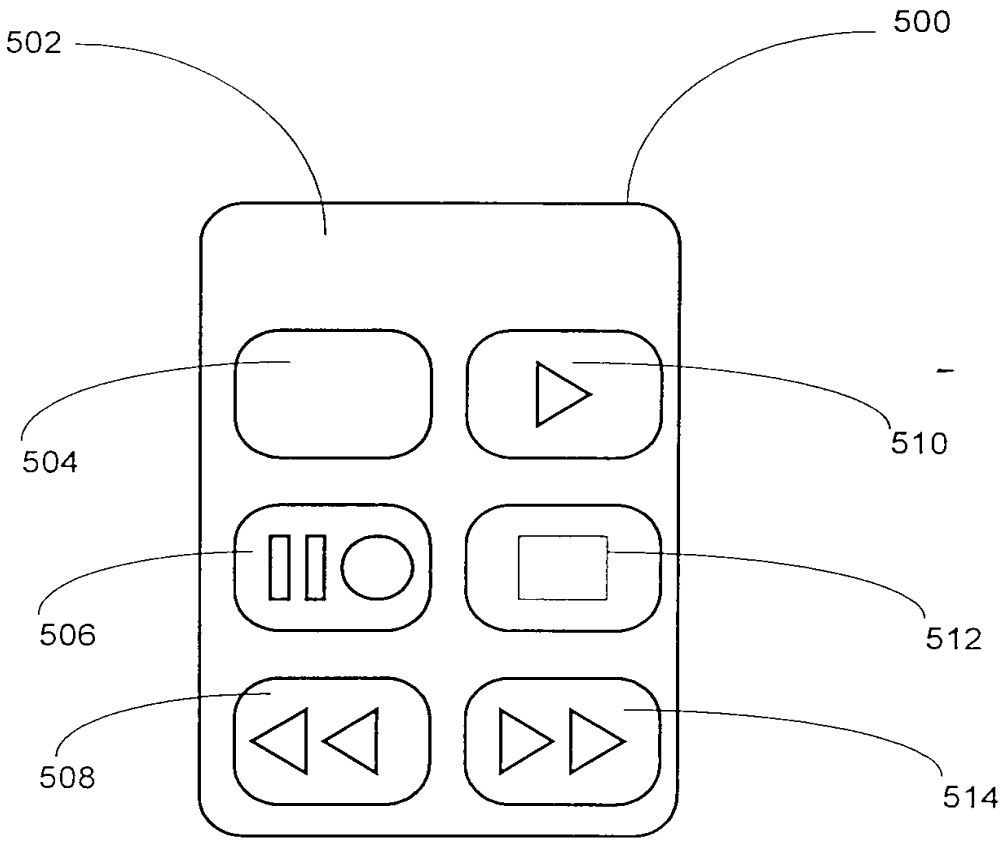

Fig. 5

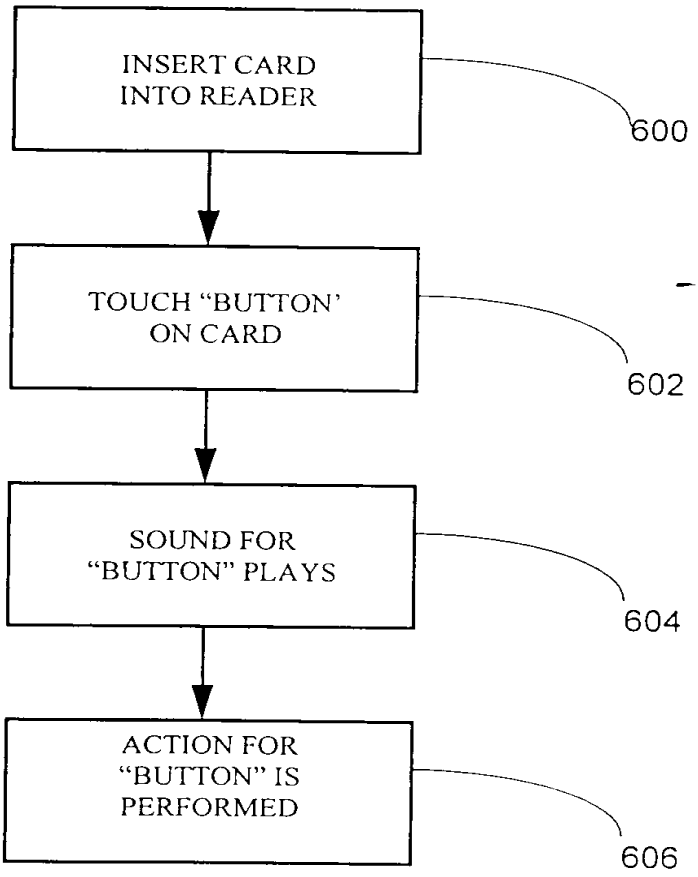
INSERT CARD INTO READER
600
TOUCH "BUTTON' ON CARD
602
SOUND FOR "BUTTON" PLAYS
604
ACTION FOR "BUTTON" IS PERFORMED
606

Fig. 6

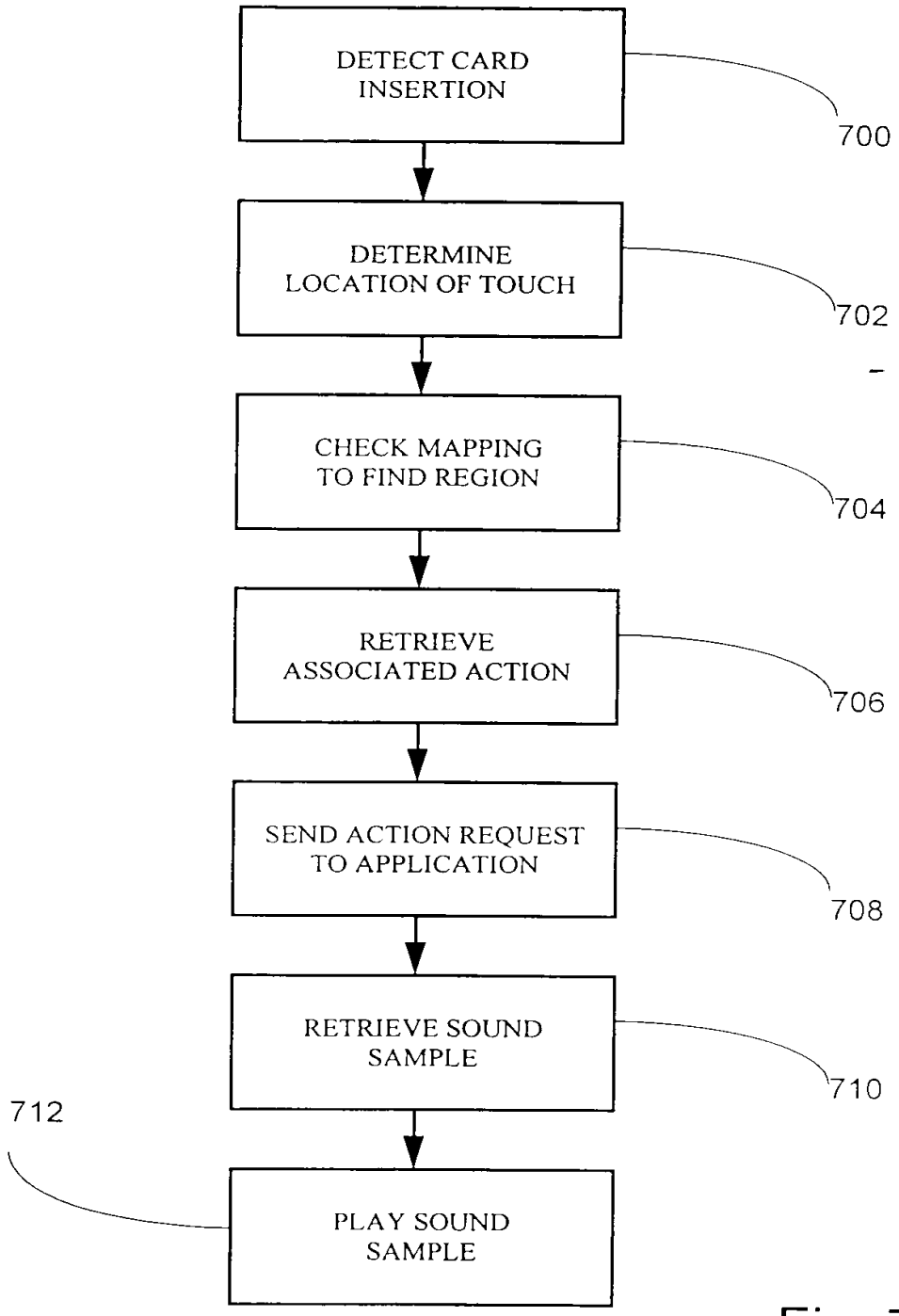
DETECT CARD INSERTION
700
DETERMINE LOCATION OF TOUCH
702
CHECK MAPPING TO FIND REGION
704
RETRIEVE ASSOCIATED ACTION
706
SEND ACTION REQUEST TO APPLICATION
708
RETRIEVE SOUND SAMPLE
710
712
PLAY SOUND SAMPLE

Fig. 7

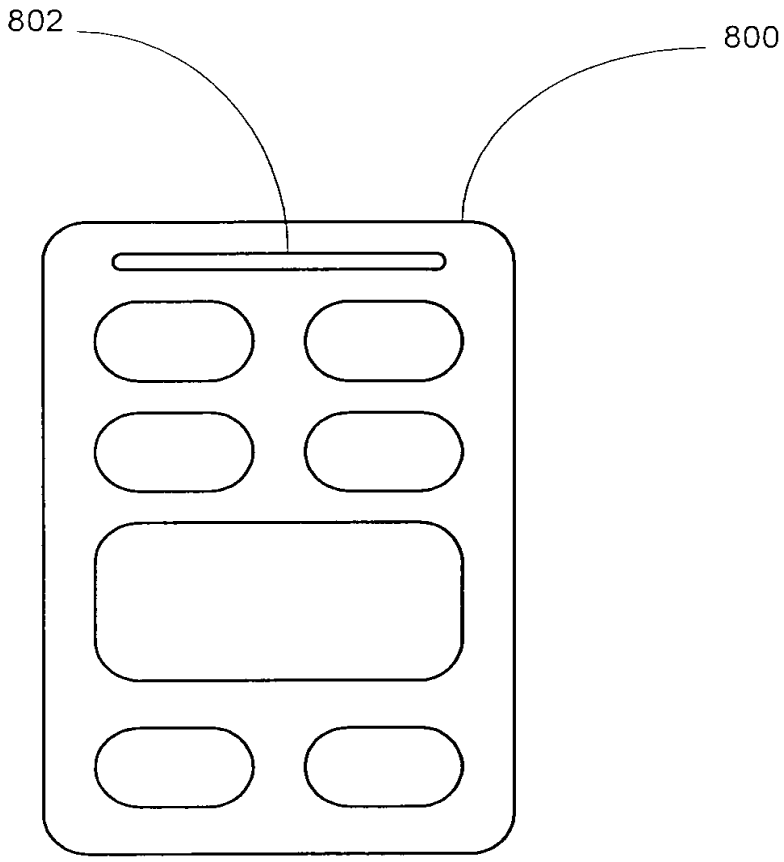

Fig. 8

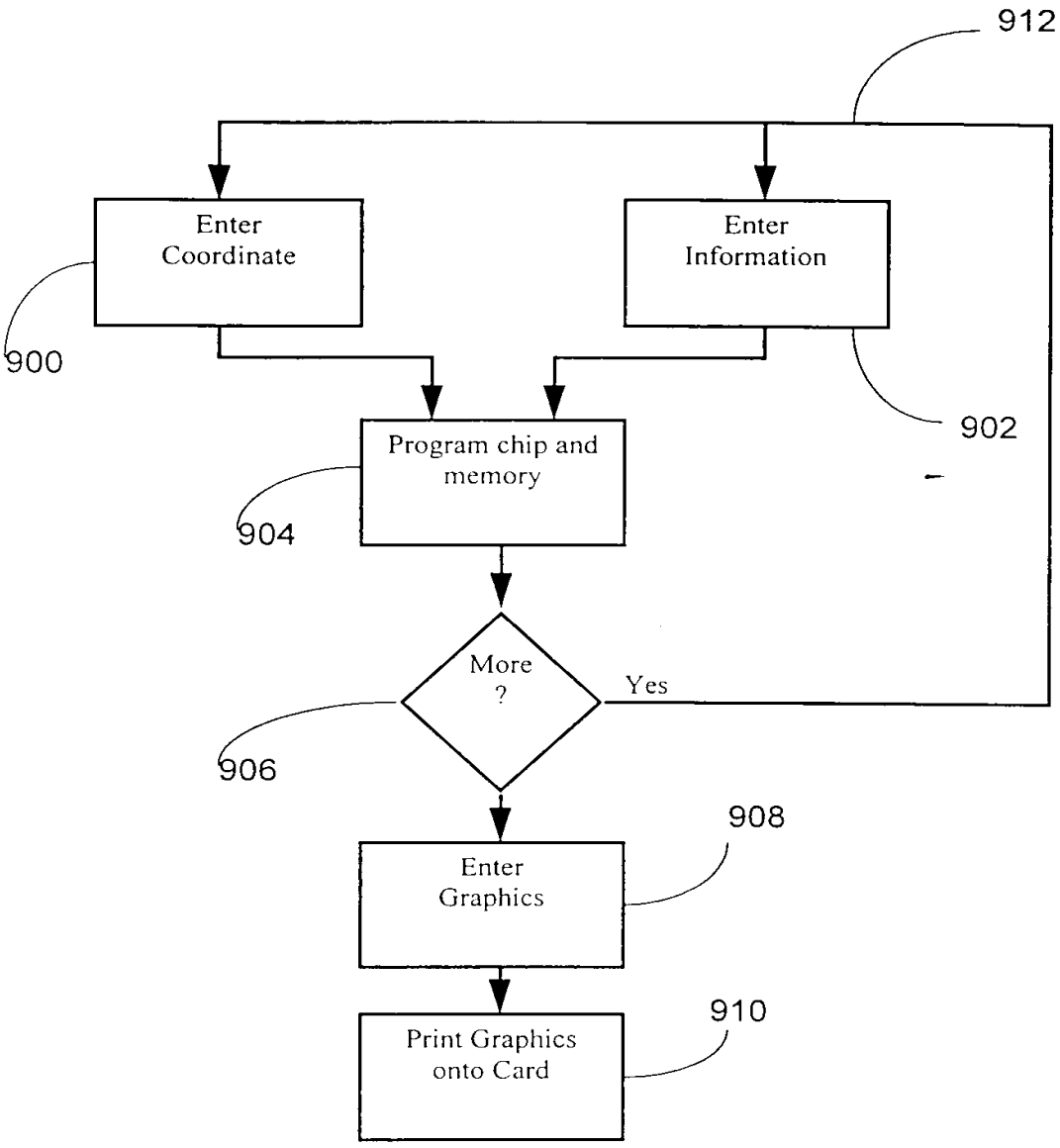
912
Enter Coordinate
Enter Information
900
902
Program chip and memory
904
More ?
Yes
906
908
Enter Graphics
910
Print Graphics onto Card

Fig. 9

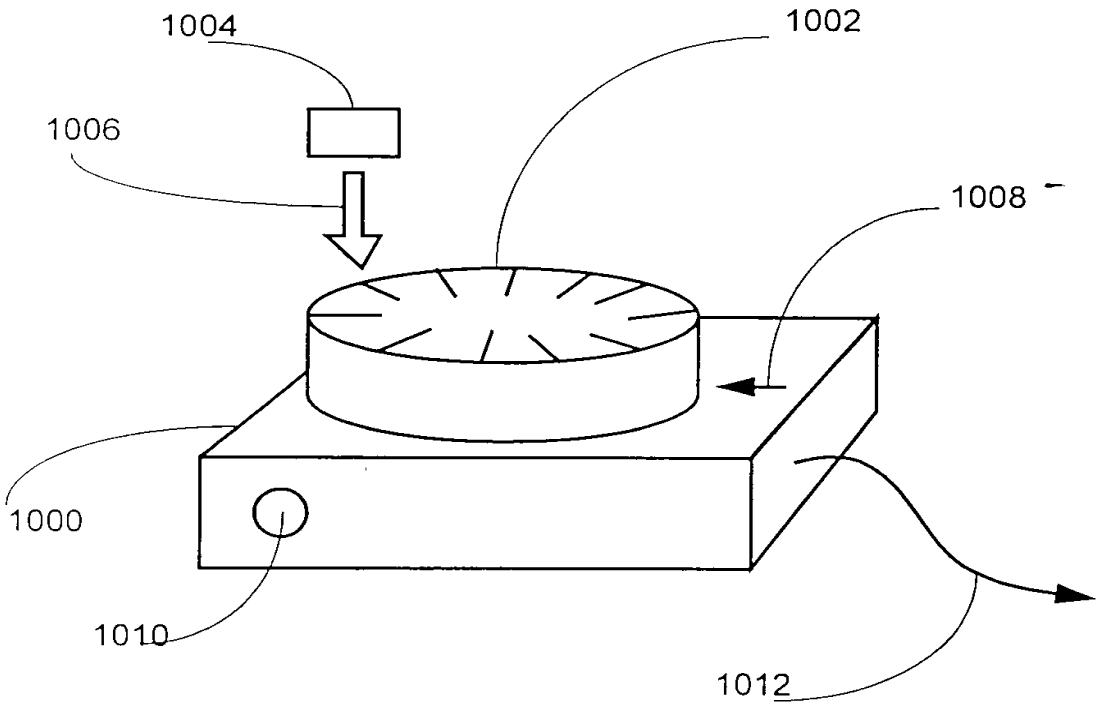

Fig. 10